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BACKGROUND PAPER JUNE 1989

NUCLEAR NON-PROLIFERATION: THE STATUS AND PROSPECTS

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The need to restrain the military threat of nuclear energy has been evident to many people from the early days of the atomic age. Indeed, the very first UN General Assembly resolution, of January 1946, called for the elimination of nuclear weapons from state arsenals. In the same year, the government of the United States, which was the first to manufacture these weapons and to use them, proposed the establishment of an international authority to control all atomic energy activities. This proposal, known as the Baruch Plan, met with no success. In 1949 the Soviet Union also became a nuclear weapon power, followed in 1952 by the United Kingdom, in 1960 by France, and in 1964 by China.

The realization that proliferation of nuclear weapons would pose a danger to world security led to the development of a non-proliferation regime which encompasses various restrictive rules as well as specialized control institutions, both national and international. Among the latter, the International Atomic Energy Agency (IAEA) fulfils an essential practical role, but the pivotal place in the regime belongs to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), signed in 1968. The NPT is a unique document in the sense that it prohibits the possession by an overwhelming majority of states of the most destructive weapons yet invented, while tolerating the retention of the same weapons by a handful of nations. But the NPT is not an end in itself: the declared aim of the parties is to use it as a transitional measure to clear the way towards nuclear disarmament.

In spite of the inequality of treaty rights and obligations of the nuclear and non-nuclear weapon parties, the NPT, in force since 1970, has attracted a record number of adherents for an arms control agreement—nearly 140. These include three nuclear weapon powers—the United Kingdom, the United States and the Soviet Union—as well as almost all highly developed, industrialized and militarily significant non-nuclear weapon states. France, a nuclear weapon power which has not signed the NPT, has a declared policy of behaving like a state party to it. China, the fifth nuclear weapon power, has given solemn assurances that it would not help other states to acquire nuclear weapons.

In the course of the past two decades the non-proliferation regime has been strengthened in spite of certain reverses in the field of nuclear export control. No material breaches of the NPT have been recorded, and no intentions to withdraw have been announced. However, the non-proliferation regime is also experiencing a few disquieting trends. This is due to the planned acquisition of nuclear-powered submarines by non-nuclear weapon states, the growing trade in nuclear-capable missiles and the emergence of new suppliers of nuclear hardware and services. Moreover, the danger that a nuclear "threshold" country may join the "club" of established nuclear weapons states continues to exist.

NPT PROVISIONS AND THEIR IMPLEMENTATION

Non-Transfer and Non-Acquisition of Nuclear Weapons

The essential non-proliferation undertakings are contained in the first two articles of the NPT. Article I places the nuclear weapon states under the obligation not to transfer "to any recipient whatsoever" nuclear weapons or other nuclear explosive devices or control over them, and not in any way to "assist, encourage, or induce" any non-

nuclear weapon state to manufacture or acquire such weapons or devices. Article II pledges the non-nuclear weapon states not to receive nuclear weapons or other nuclear explosive devices or control over them, as well as not to manufacture them or receive assistance in their manufacture.

The implementation of the first part of Article I prohibiting transfer of nuclear explosive devices, though unverifiable, has not given rise to formal complaints. The extent to which the second part of Article I has been observed — that part prohibiting the provision by the nuclear weapon states of assistance in the manufacture of nuclear weapons — has lent itself to controversy. Since there exists a significant overlap between the technologies of civilian nuclear energy and those useful for military explosive purposes, and since nuclear material and technology nominally destined for power programmes have been exported by NPT parties to countries which have not formally forgone nuclear weapons, it is argued by some that the obligation not in "any way" to assist non-nuclear weapon states to manufacture nuclear explosive devices has not been fully complied with.

As regards Article II, there is no evidence that any non-nuclear weapon state party to the NPT has clandestinely manufactured or otherwise acquired nuclear explosive devices. If any one of them has designed a nuclear weapon or even developed its non-nuclear components, these activities would be difficult to detect. Should such a state ever decide actually to produce a nuclear weapon, it would need the requisite quantity of weapon-grade fissile material. The availability of this material is, therefore, of crucial significance; hence the importance of safeguards to prevent its diversion from peaceful to military uses.

Nuclear Safeguards and Protection of Nuclear Material

The safeguards requirement under Article III constitutes the verification element of the NPT. Safeguards should enable detection of diversion of significant quantities of nuclear material from peaceful activities to the manufacture of nuclear explosive devices, as well as deterrence of diversion by creating the risk of timely detection. No such diversion has as yet been reported by the IAEA, although on several occasions the Agency has been hindered in its inspection activities.

The Treaty requires safeguards to be implemented in such a manner as to avoid hampering the economic or technological development of the countries party to it or international cooperation in the field of peaceful nuclear activities. This requirement seems to have been met, although there have been some complaints that controls complicate the production process or are a burden for enterprises because of the cost and the threat to industrial secrets. More controversial is the clause setting forth the conditions for nuclear trade with non-nuclear weapon countries. This clause has been applied in a way that has sometimes benefited non-parties more than parties. For whereas parties are subject to NPT safeguards covering all their peaceful nuclear activities, the nuclear activities of non-parties are covered only partially, by sateguards of the pre-NPT order, which apply exclusively to imported items — individual installations or material — while part of the nuclear fuel cycle may remain unsafeguarded. Many suppliers concerned about the dangers of nuclear proliferation inherent in the distinction between imported and domestic technology have sought to impose on non-parties full-scope safeguards, as extensive as NPT-type safeguards. A few suppliers, however, are reluctant to modify radically their export conditions.

An important step towards reducing the risks of diversion of nuclear material to non-peaceful purposes was made in 1987, with the entry into force of the 1980 Convention of the Physical Protection of Nuclear Material. The provisions of the Convention oblige the parties to ensure that, during international transport across their territory or on ships or aircraft under their jurisdiction, nuclear material for peaceful purposes, as categorized in a special annex (plutonium, uranium-235, uranium-233 and irradiated fuel), is protected at the agreed level. Furthermore, the parties undertake not to export or import nuclear material or allow its transit through their territory unless they have received assurances that this material will be protected during international transport in accordance with the levels of protection determined by the Convention. The parties to the Convention agree to share information on missing nuclear material to facilitate recovery operations. Robbery, embezzlement or extortion in relation to nuclear material, and acts without lawful authority involving nuclear material which cause or are likely to cause death or serious injury to any person or substantial damage to property, are to be treated as punishable offences.

Towards the end of 1987, alarm was raised in the Federal Republic of Germany and Belgium because of alleged illegal cross-border transportation of canisters with nuclear wastes. It was asserted that at least some canisters were falsely labelled and actually contained fissionable material destined for Pakistan and Libya. No evidence was supplied to support this allegation. It seems, none the less, that some serious irregularities in the transportation of radioactive substances did take place. It is noteworthy that by January 1989 the members of the European Community had not ratified the Physical Protection Convention, even though shipments of nuclear material in the territories of the Community are very intensive.

Peaceful Uses of Nuclear Energy

Article IV of the NPT reaffirms the right of parties to develop nuclear energy for peaceful purposes in conformity with Articles I and II of the Treaty and obligates those parties in a position to do so to contribute to such efforts in non-nuclear weapon states. The implementation of Article IV has been affected to a great extent by the worldwide slow-down in the growth of civilian nuclear power owing to environmental, safety and economic factors, which include a weak increase in

electricity demand, high initial investment costs and shortage of capital. In addition, restrictions have been imposed on nuclear supplies ever since India, a non-party to the NPT, took advantage of the lenient pre-NPT safeguards applied to its nuclear activities to explode a nuclear device.

In 1977, a group of nuclear suppliers, the so-called London Club, drew up a list of materials, equipment and technology which should "trigger" IAEA safeguards when exported to non-nuclear weapon states not party to the NPT (the parties having already accepted the requirement for safeguards on all their nuclear activities). The Guidelines for Nuclear Transfers agreed by the London Club require the recipients of the trigger-list items to provide effective physical protection for these items, and to pledge not to use them for the manufacture of nuclear explosives. The safeguards requirements apply to any "replicated" facility, that is, of the same type as the imported facility but constructed indigenously within a specified period.

Retransfers of trigger-list items are to be subject to the same conditions as those attached to the original transfer. In the event of the diversion of materials or a violation of the supplier/recipient understandings, the members of the London Club should consult promptly on possible common action. Moreover, "restraint" is recommended in the transfer of sensitive facilities, such as uranium enrichment and plutonium reprocessing plants. Significantly, this restraint is to be exercised not only with respect to non-parties, but also with respect to parties to the NPT. In 1978 the US unilaterally set even sterner restrictions on nuclear supplies by adopting the Nuclear Non-Proliferation Act (NNPA).

Spokesman of many countries, especially from the Third World, have criticized the restrictive measures taken by the suppliers as an infringement of the right to nuclear supplies implied in NPT Article IV. Their argument is that, once governments have accepted the safeguards provided for in Article III, no further limitation should be placed on peaceful nuclear programmes. The Committee on Assurances of Supply which was set up by the IAEA to consider and advise on "ways and means in which supplies of nuclear material, equipment and technology and fuel cycle services could be assured on a more predictable and long-term basis in accordance with mutually acceptable considerations of non-proliferation" has not, as yet, produced agreed principles of international cooperation. Also the UN conference on the peaceful uses of nuclear energy, which met in Geneva in March-April 1987, failed to work out such principles, mainly because non-parties to the NPT refused to take account of nuclear-weapon proliferation concerns related to supplies of nuclear material and equipment.

Peaceful Nuclear Explosions

Under Article V of the NPT, the potential benefits of peaceful applications of nuclear explosions are to be made available by the nuclear weapon parties to non-

STATES PARTY TO THE NON-PROLIFERATION TREATY AS OF MAY 1989*

Afghanistan
Antigua and Barbuda
Australia
Austria
Bahamas
Bahrain
Bangladesh
Barbados
Belgium
Belize
Benin
Bhutan
Bolivia
Botswana
Brunei Darussalam
Bulgaria
Burkina Faso
Burundi
Cameroon
Canada
Cape Verde
Central African Republic
Chad
Colombia
Congo
Costa Rica
Côte d'Ivoire
Cyprus
Czechoslovakia
Democratic Kampuchea
Democratic Yemen
Denmark
Dominica
Dominican Republic
Ecuador
Egypt
El Salvador
Equatorial Guinea
Ethiopia
Fiji
Finland
Gabon
Gambia
German Democratic Republic
Germany, Federal Republic of
Ghana
Greece
Grenada
Guatemala
Guinea
Guinea-Bissau
Haiti
Holy See
Honduras
Hungary
Iceland
Indonesia
Iran
Iraq
Ireland
Italy
Jamaica
Japan
Jordan
Kenya
Kiribati
Korea, Democratic People's Republic
Korea, Republic of
Lao People's Democratic Republic
Lebanon
Lesotho
Liberia
Libya
Liechtenstein
Luxembourg
Madagascar
Malawi
Malaysia
Maldives
Mali
Malta
Mauritius
Mexico
Mongolia
Morocco
Nauru
Nepal
Netherlands
New Zealand
Nicaragua
Nigeria
Norway
Panama
Papua New Guinea
Paraguay
Peru
Philippines
Poland
Portugal
Qatar
Romania
Rwanda
Saint Lucia
Saint Vincent and the Grenadines
Samoa
San Marino
São Tomé and Principe
Saudi Arabia
Senegal
Seychelles
Sierra Leone
Singapore
Solomon Islands
Somalia
Spain
Sri Lanka
Sudan
Suriname
Swaziland
Sweden
Switzerland
Syria
Thailand
Togo
Tonga
Trinidad and Tobago
Tunisia
Turkey
Tuvalu
Uganda
USSR
United Kingdom
United States
Uruguay
Venezuela
Vietnam
Yemen Arab Republic
Yugoslavia
Zaire

* Kuwait has signed but so far not ratified the Treaty. Taiwan has signed and ratified the Treaty, but is no longer recognized as a state by the United Nations.

nuclear weapon parties under appropriate international observation. This promise was made in exchange for the renunciation by the latter states of the right to conduct any nuclear explosions, because there is no way to assure that a nuclear explosion has no military function.

However, there is considerable skepticism about the technical feasibility, economic viability and political acceptability of nuclear explosions for peaceful purposes. It is now recognized that conventional explosives can achieve equivalent results without the environmental and health risks accompanying nuclear detonations. The prevailing opinion, at least among the parties to the NPT, seems to be that peaceful uses of nuclear explosions entail more hazards than benefits. By tacit agreement, therefore, the practical implementation of this provision has been kept in abeyance.

Disarmament Obligations

The obligations under Article VI are generally considered to be of particular consequence. For in signing the NPT the parties agreed that the self-imposed arms denial of one side — the non-nuclear weapon states — was to be matched, ultimately, by corresponding acts of the other side — the nuclear weapon powers. They have therefore undertaken to pursue negotiations "in good faith" to halt the nuclear arms race "at an early date" and to bring about nuclear disarmament.

The NPT is the only existing international document under which the major nuclear powers are legally committed to nuclear disarmament. However, with the exception of the ABM Treaty restricting ballistic missile defences, the strategic nuclear arms control agreements concluded in the 1970s — the 1972 SALT Interim Agreement and the 1979 SALT Treaty — were of low disarmament value, as they merely regulated the US-Soviet competition at a high level of armaments. Besides, these agreements are no longer in force. The first meaningful measure of nuclear disarmament was adopted in 1987 with the signing of the US-Soviet INF Treaty eliminating ground-launched missiles with a range of 500 to 5,500 kilometres, but no effective steps have been taken so far to restrain the qualitative improvement of nuclear weapons, such as a comprehensive ban on nuclear weapon testing.

Nuclear Weapon-Free Zones and Countries

Article VII of the NPT affirms the right of states to conclude regional treaties in order to assure the total absence of nuclear weapons in their respective territories. Two such treaties covering large populated areas have so far been concluded: the 1967 Treaty of Tlatelolco prohibiting nuclear weapons in Latin America and the 1985 Treaty of Rarotonga setting up a nuclear-free zone in the South Pacific. As a unilateral adjunct of the Treaty of Rarotonga, the parliament of New Zealand adopted in 1987 an act establishing the New Zealand Nuclear-Free Zone which comprises all land and waters within the territorial limits of New Zealand, as well as the airspace above these areas. The Act states that the prime minister may grant approval for the entry of foreign warships into the internal waters of New Zealand only if he is satisfied that the warships will not be carrying any nuclear explosive device upon their entry into these waters. Similarly, approval for the landing in New Zealand by foreign military aircraft may be granted by the prime minister only if he is satisfied that the aircraft will not be carrying any nuclear explosive device when it lands. Entry into the internal waters of New Zealand by any ship whose propulsion is wholly or partly dependent on nuclear power is also prohibited.

In 1988, at the initiative of the opposition Social Democratic Party, the parliament of Denmark passed a resolution requesting the government to notify all visiting warships that they must not carry nuclear arms into Danish ports. From the formal point of view, the resolution merely reiterated the official Danish policy which had been proclaimed more than three decades earlier, namely, that the introduction of nuclear weapons to the country is prohibited during peacetime. In practice, however, the resolution signified a rejection of the policy of "neither confirming nor denying" the presence of nuclear weapons, which has so far been strictly adhered to by the navies of all the nuclear weapon powers. Eventually, however, under pressure exercised within NATO, mainly by the United States and the United Kingdom, Denmark agreed to adopt the Norwegian formula. Norway, which has also unilaterally declared its territory to be free of nuclear weapons in peacetime, proceeds on the assumption that this declaration is respected by the visiting foreign ships or aircraft and does not seek specific assurances. Several other countries as well, including members of the military alliances, have formally prohibited (as have Japan, Iceland and Spain) or have contemplated prohibiting (as has the Philippines) foreign ships or aircraft from entering their territories with nuclear weapons aboard. None, however, has so far tried to enforce this prohibition.

In Sweden, the ruling Social Democratic Party, at its 1987 congress, decided that efforts should be made to make the nuclear powers forgo the practice of not giving information regarding the presence of nuclear weapons on their warships. It was resolved that, should the nuclear powers decline to give up this practice, the rules for military visits would be tightened: the powers in question would be requested to make an explicit statement that nuclear weapons were not entering Swedish territory, including its airspace. The visits would be refused if no such information were provided. This policy was confirmed by the Swedish prime minister in his speech made at the 1988 Third UN Special Session on Disarmament.

NEW DEVELOPMENTS ENDANGERING THE NON-PROLIFERATION REGIME

Naval Propulsion

In 1988 it became known that India had leased a nuclear-powered submarine from the Soviet Union[1] and that the submarine was equipped with cruise missiles.[2]

The lease was apparently intended to lead to the purchase of several submarines by India and/or to help India develop an indigenously designed nuclear-propulsion system. The conditions of the leasing arrangement have not been made public. However, since Soviet submarines use highly enriched uranium which can also be used to produce nuclear weapons, and since India refuses to forsake the nuclear weapon option, it is debatable whether the Soviet-Indian deal is compatible with the goal of non-proliferation.

Another instance of nuclear-propulsion proliferation has been the possible acquisition by Canada of a fleet of nuclear-powered submarines equipped with conventionally armed torpedoes. However, as distinct from India, Canada is party to the NPT and has accepted full-scope IAEA safeguards. Consequently, the concerns regarding this acquisition are not of the same order as in the case of India. As a matter of fact, under the NPT, non-nuclear weapon states are prohibited only from using nuclear materials for explosive purposes; the use of such materials for naval propulsion is not prohibited. Paragraph 14 of the "Structure and Content of Agreements between the Agency and States," required in connection with the NPT, provides for a special arrangement for withdrawing nuclear material from IAEA safeguards, so that it can be used in non-proscribed military activities. The arrangement between the state in question and the IAEA should identify the circumstances during which safeguards would not be applied. The state would have to make it clear that the unsafeguarded material (the quantity and composition of which must be known to the IAEA) would not be used for the production of nuclear weapons or other nuclear explosive devices. According to the authoritative interpretation, based on the negotiating history, the exemption from safeguards is to be strictly limited to the material in the propulsion reactors and should not include other stages of the nuclear fuel cycle; safeguards must again apply as soon as the nuclear material is reintroduced into a peaceful nuclear activity for reprocessing or for other, inherently non-military industrial treatment.

If Canada were to come into possession of nuclear-powered submarines, it may avail itself of the exemption provision referred to above. This may not affect its commitment to the cause of non-proliferation of nuclear weapons, but would set an unfortunate precedent for the non-application of nuclear safeguards by the parties to the NPT.[3] Among other states known to be planning the acquisition of nuclear-powered submarines are Argentina and Brazil, both hold-outs from the NPT.[4]

Dual-Capable Missiles

One recommendation frequently made for the strengthening of the non-proliferation regime has been to complement the existing restraints on supplies of nuclear material and equipment by restraints on supplies of dual-capable weapon systems, that is, systems capable of delivering both conventional and nuclear weapons. This recommendation was partly put into practice in April 1987 when seven governments, those of Britain, Canada, France, the Federal Republic of Germany, Italy, Japan and the US, adopted identical guidelines to control the exports of equipment and technology which "could make a contribution" to missile systems capable of delivering a nuclear weapon.

The missile export control guidelines constitute an important initiative, in so far as they can make it more difficult, and perhaps more expensive, for countries to acquire a nuclear weapon delivery capability. However, the regime is focused on large missiles and rockets; it is not designed to constrain more sophisticated forces. It ignores such important and relatively easily available nuclear delivery vehicles as aircraft. Moreover, the restrictions have come somewhat late. Companies from the Federal Republic of Germany, France and Italy have been collaborating for some time with Third World missile producers, and both the US and the USSR have provided different types of missiles to several countries. In particular, Iraq, Iran, Libya, Syria and South Yemen are now in possession of Soviet-made missiles, some of which have been modified to reach a range of several hundred kilometres. In addition, negotiations are said to have been held for the sale of a new 600-kilometre-range Chinese missile to Syria. India has put a satellite into orbit with its own rocket and has started testing a 250-kilometre-range missile. Also Israel has demonstrated that it possesses a rocket powerful enough to launch a satellite into space and has reportedly deployed intermediate-range (over 1,000 kilometres) ballistic missiles in the Negev Desert. Pakistan has successfully test-fired indigenously developed surface-to-surface rockets capable of carrying a payload of more than 500 kilograms. Argentina is developing — in cooperation with Iraq and Egypt — a medium-range (800-950 kilometres) two-stage rocket with a payload of some 350 kilograms, whereas Brazil is known to manufacture and export a wide variety of rockets. A major deal was the purchase by Saudi Arabia of Chinese surface-to-surface ballistic missiles having a range of about 3,000 kilometres, and designed to deliver nuclear warheads.

Some of the recipient countries may be many years away from a nuclear weapon manufacturing capability, but if they decided to go nuclear they would certainly adapt for nuclear delivery those missiles they already possess. It is therefore widely recognized that to be more effective in reducing the risk of nuclear weapon proliferation, especially among non-parties to the NPT, the seven-nation missile technology control regime would have to be subscribed to by all suppliers of missiles, including of course the Soviet Union and China; the regime itself would have to be made sterner and its scope would need broadening. Exploratory talks on this subject have already been held between the United States and the Soviet Union.

The Emergent Nuclear Suppliers

The world nuclear market is dominated by a handful of industrial nations. However, the pattern of supplies is

gradually changing as former buyers are acquiring the capability of developing their own nuclear technology and become themselves sellers of nuclear hardware and services. The new suppliers are mostly from the Third World. Their share in the global nuclear trade is still very modest. They are not in a position to provide modern sophisticated equipment, but they may offer an attractive alternative for those countries which shun the restrictive policies of the traditional suppliers.

So far, there has been no significant damage done to the non-proliferation regime by the emergent suppliers, because most transactions are internationally safeguarded. But the newcomers — among whom the most active are China, Argentina, Brazil and India — may decide to be less demanding as regards the application of safeguards; they are not bound by the 1977 London Guidelines for Nuclear Transfers. As a consequence, surveillance of nuclear developments, especially in non-NPT countries, could become even more difficult. Particularly destabilizing would be an uncontrolled trade in sensitive items, including nuclear spent fuel reprocessing and uranium enrichment technologies, for it could considerably weaken the non-proliferation regime. A dialogue would therefore be desirable between the emerging and established suppliers with a view to working out generally acceptable rules.[5]

THE NUCLEAR THRESHOLD COUNTRIES

States which have neither acknowledged the possession of nuclear weapons nor joined the NPT but conduct significant nuclear activities and operate unsafeguarded nuclear plants capable of making nuclear weapon-usable material are usually referred to as nuclear threshold states; those belonging to this category are Argentina, Brazil, India, Israel, Pakistan and South Africa.

Israel

In 1986 a former technician from an Israeli nuclear facility asserted that Israel had a substantial nuclear arsenal. If proved correct, this information may mean that there are six states in the world which possess nuclear weapons rather than five, as previously believed. However, the official Israeli position on nuclear matters remains unchanged: Israel affirms, somewhat ambiguously, that it will not be the first country to introduce nuclear weapons into the Middle East.[6]

The establishment of a zone free of nuclear weapons in the Middle East has been repeatedly proposed in recent years, but the realization of this proposal is conceivable only within the framework of an overall political settlement of the Middle Eastern conflict and consequent significant cuts in all categories of weapons.

Pakistan and India

Evidence has accumulated in the past few years that both countries possess all the essential elements for the manufacture of nuclear weapons. It is thus now an established fact that, with the help of technology and hardware obtained from abroad clandestinely or with the indulgence of the supplier's authorities, Pakistan is producing highly enriched, weapon-grade uranium. It may not yet have assembled a complete nuclear explosive device but, according to independent experts, its unsafeguarded enrichment plant has the capacity to produce enough fissile material for one to four weapons annually.[7]

India tested a nuclear device in 1974. Since then, it has greatly increased its plutonium production capacity (owing partly to clandestine imports of heavy water), has acquired uranium-enrichment technology, and is considered by some analysts to be able to produce over fifteen nuclear weapons per year.[8]

Pakistani proposals for signing the NPT simultaneously with India, or declaring the denuclearization of the South Asian region, or at least accepting reciprocal inspections of nuclear facilities, have so far been rejected by India.

South Africa

Accusations have been repeatedly made, mainly in the United Nations, that South Africa has clandestinely manufactured and tested a nuclear weapon. The suspicion is compounded by South Africa's refusal to allow the IAEA to inspect its uranium-enrichment facility, which has the capacity of producing weapon-grade uranium, and by South Africa's admission that it can produce a nuclear bomb.

The attitude of South Africa towards the NPT has always been ambivalent. Unlike India, Pakistan or Israel, South Africa has no obvious military incentives to build a nuclear arsenal. In 1987 the South African president stated that his government was prepared to commence negotiations with each of the nuclear weapon states on the possibility of joining the NPT. The obvious aim of this diplomatic move was to stave off an effort by several Third World states, led by Nigeria, to suspend South Africa from the exercise of the rights and privileges of its IAEA membership. A view then prevailed in the IAEA that the decision regarding South African membership should be postponed to allow the planned "negotiations" to take place. Indeed, in August 1988, South African representatives met with representatives of the UK, US and Soviet governments, which are depositaries of the NPT, and discussed "a wide range of issues." The South African delegation stated that it would report back to its government and that consideration would be given to the full implications of accession to the NPT. Under the pressure from certain influential delegations, the 1988 IAEA General Conference granted a further year's stay of execution of the threat to suspend South Africa's IAEA membership.

Brazil and Argentina

It was revealed in 1987 that Brazilian scientists had mastered the centrifuge technology for uranium enrichment (a technology used by only a few developed countries) and had begun the construction of a large enrichment plant soon to be put into operation. This was achieved, apparently, without outside help, in a secret, so-

called parallel nuclear programme centred at an institute in São Paulo. The enrichment plant, to be run by the Brazilian Navy, is not to be covered by international safeguards and can therefore be used for the manufacture of uranium for weapon purposes.

In announcing this technological breakthrough, Brazil reiterated its commitment to using nuclear energy exclusively for peaceful purposes, a commitment which was subsequently included in the new Brazilian Constitution. However, of the three reactors now possessed or being built by Brazil, one barely functions owing to constant breakdowns, and the construction of the other two is almost at a standstill. In addition, the planned Brazilian nuclear-powered submarine cannot be built before the turn of the century. In this situation, it is questionable what peaceful purposes can be served by the production of enriched uranium, which is expected to start soon, if there are no civil power reactors or submarine reactors to use it. The prospects for exporting substantial quantities of enriched uranium to other countries are not bright either, considering the competition among the established suppliers on a saturated world market.

Argentina operates an unsafeguarded uranium-enrichment plant (using the traditional gaseous diffusion technology) configured to produce 20-percent-enriched fuel, even though all the reactors in the country run on natural or slightly enriched uranium. Argentina does not appear to be able as yet to produce weapon-grade uranium, but, as regards the technique for separating plutonium from spent reactor fuel, it is more advanced than Brazil; a reprocessing plant, designed to separate 15 kilograms of plutonium a year is under construction. It is noteworthy, however, that in recent years the role of the Argentine military in directing nuclear affairs has been reduced.

The danger of nuclear weapon proliferation in Latin America has been dampened by an improvement of political relations between Brazil and Argentina. A regional policy centred on economic cooperation, in particular in the nuclear field, seems to be replacing the rivalry between the two countries based on nationalistic military considerations.

Others

In addition to the threshold countries, there are four parties to the NPT—Iran, Iraq, Libya and Taiwan—whose commitments to the Treaty have been questioned even though their nuclear activities are internationally safeguarded. The first three countries are at a very early stage of nuclear development and lack the industrial infrastructure needed to support a significant indigenous nuclear programme. Moreover, some Iranian and Iraqi nuclear facilities under construction were severely damaged during the Gulf War. By contrast, Taiwan, which has a well-developed civil nuclear energy programme, has been obliged, under pressure from the United States, to abandon nuclear activities of dubious intent.

CONCLUSION

The nuclear non-proliferation regime has proved to be fairly robust. There is a good chance that the next NPT Review Conference in 1990 will reaffirm the validity of, and the support for, the NPT, and that the 1995 Conference, which is to decide the Treaty's future, will extend the duration of the NPT for another lengthy period.

Non-proliferation has become a norm of international behaviour which cannot be easily defied. However, the ultimate solution to the problem of nuclear proliferation would be possible only in a world in which the possession of nuclear weapons is recognized as both unnecessary and unacceptable. This goal is still remote. To bring it nearer, the process of nuclear arms reduction and elimination should continue without interruption.

NOTES

1. *Pravda*, 6 January 1988.
2. *Le Monde*, 11 February 1988.
3. For a more extensive treatment of this subject, see: B. Sanders and J. Simpson, *Nuclear Submarines and Non-Proliferation: Cause for Concern*, Programme for Promoting Nuclear Non-Proliferation, Occasional Paper Two, 1988; M-F. Desjardins and T. Rauf, *Opening Pandora's Box? Nuclear-Powered Submarines and the Spread of Nuclear Weapons*, The Canadian Centre for Arms Control and Disarmament, Aurora Papers, no. 8, 1988.
4. *Jane's Defence Weekly*, 23 July 1988.
5. For detailed proposals to this effect, see: L.A. Dunn, "Nonproliferation: The Next Steps," *Arms Control Today*, November 1987.
6. A. Cohen and B. Frankel, "Israel's Nuclear Ambiguity," *Bulletin of the Atomic Scientists*, March 1987.
7. *Nuclear Weapons and South Asian Security*, Report of the Carnegie Task Force on Non-Proliferation and South Asian Security, Carnegie Endowment for International Peace, Washington, DC, 1988.
8. *Ibid.*

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